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December 2013

Name of Reviewer: **Gwen Herron-Moon**
Date of Review: April 25, 2012, updated October 11, 2012 and April 25, 2013

Lower Duwamish Waterway 104(e) Review Checklist

Name of 104(e) Recipient **Jorgensen Forge Corporation**

Contact person

Name	Ron Altier, Vice President Administration, The Jorgensen Corporation
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With Copy to:

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GNL Recipient Yes No **X**

CERCLA Liability of Recipient

Owner	**Yes**	**Hazardous Substances on property owned by recipient?**	**Yes**
		If Past Owner, release of hazardous substances during time of ownership?	**N/A**
Operator	**Yes**	**Hazardous Substances used in operations?**	**Yes**
		If Past operator, release of hazardous substances at time of operation?	**N/A**
Generator	**No**	**Hazardous substances generated?**	**No**
Transporter	**No**	**Hazardous substances transported?**	**No**
Release of hazardous substances at property?	**Yes**	**Defenses? Cleanup responsibility shared with prior owner**	
Release to River, or Pathway to River?	**Yes**	**Petroleum Products Only**	**No**

Did the Recipient Purchase the Property after 1980? Yes **X** No

Did the Recipient Purchase the Property after January 11, 2002? Yes No **X**

PRP Ranking

Based on the information above, please mark the PRP Ranking with an "X" in the table below.

Category Ranking	Criteria	X
1	Known PRP	**X**
2	Presumed PRP	
3	Presumed Minor PRP	
4	Follow-up	
5	No longer pursue	

Recommendation

The Jorgensen Forge Corporation (Jorgensen Forge) is the current owner and operator of parcel #0001600023, located at 8531 East Marginal Way South. Since 1992, Jorgensen Forge has owned the property. Jorgensen Forge was developed as a fabricator of structural steel, tractor, and road equipment. Operations include forging, heat-treating, and cutting prefabricated steel rods to customers' specifications.

From 1991 to present, environmental investigations, groundwater monitoring, and interim remedial actions have been conducted for petroleum hydrocarbons (oil and gasoline) in soil and groundwater in several areas on the Jorgensen Forge property. These areas had releases which included cutting oil beneath equipment in the north portion of the forge shop building, hydraulic oil from an oil/water separator into soil and groundwater northwest of the aluminum heat treating building, diesel and gasoline in soil and groundwater from former USTs located on the eastern portion of the facility, and diesel and gasoline in soil and groundwater from former USTs located on the eastern portion of the facility. In addition, elevated levels of PCBs and metals (arsenic, cadmium, chromium, copper, lead, silver, and zinc) above CSL were found in sediments adjacent to the facility. Jorgensen Forge conducted a source control investigation to determine if the facility was an ongoing source of contamination to sediments in the LDW. Investigations found that fill placed on the property is a potential source of PCBs and metals contamination to the LDW. The probable main source of the PCBs to Duwamish Waterway sediments is discharged from the stormwater sewer lines located along the northern property boundary with Boeing Plant 2 and placement and subsequent erosion of PCB contaminated fill on the property. However, erosion of PCB contaminated fill and the debris piles may have contributed relatively minor amounts of PCBs and some of the metals may be due to past runoff from the Jorgensen Forge facility. Booz Allen recommends a ranking of **Category 1 – Known PRP.**

Please justify your recommendation by explaining the following:

1) Describe liability status (Owner / Operator / Generator / Transporter).

The Jorgensen Forge Corporation (Jorgensen Forge) is the current owner and operator of parcel #0001600023 at 8531 East Marginal Way South. Jorgensen Forge has owned the property since

taking over operations from Earle M. Jorgensen Company (EMJ) in 1992. Since that time, Jorgensen Forge has operated an integrated forge shop with melting, forging, and machining operations at this location facility [Jorgensen Forge 104(e) Response, 1362026, p. 2].

The property was first developed in 1942, and since that time has been consistently operated by various entities as a fabricating, forging, machining and steel distribution facility [Jorgensen Forge 104(e) Response, 1362026, p. 2]. Seemingly, the property was undeveloped prior to 1936 and the surrounding properties were agricultural with the exception of a sawmill located south of the subject property [URS 2005 ESA, 623093, p. 10].

In 1942, the property was developed by the U.S. government and operated by Isaacson Iron Works from 1942 to 1965. Owned by the government, on-site operations included melting, forging, heat-treating, and machining. Isaacson Iron Works was a supplier to the U.S. Navy. The property was comprised of two parcels, A and B. The northwestern portion of the property, Parcel B, was sold to Bethlehem Steel, who operated a steel fabrication operation from 1951 to 1963. Bethlehem Steel's operations consisted of cutting prefabricated steel rods to customer specifications. The aboveground structures associated with the distribution center were removed shortly following closure of the center. Although Jorgensen Forge is not aware of any historical documentation regarding removal of these structures, there is no evidence that any of the below ground structures (e.g., stormwater conveyance system) were removed, given that the original slab-on-grade concrete foundation for the structures are still present in their original condition [Jorgensen Forge 104(e) Response, 1362026, pp. 4].

In 1965, EMJ acquired both parcels, and operated the property from 1965 to 1992. From 1992 to the present, the property has been owned and operated by Jorgensen Forge, which has continued to conduct similar operations to EMJ [Jorgensen Forge 104(e) Response, 1362026, pp. 4 and 5; TSCA Letter, 1215090, p. 1].

RM	Location	Type	Date	Reference
3.6E	Parcel #0001600023 – 8531 East Marginal Way South			
Jorgensen Forge Corporation		**Owner/ Operator**	**1992 - Present**	Jorgensen Forge 104(e) Response, 1362026, p. 5
Earle M. Jorgensen		Former Owner/ Operator	1965 - 1992	Jorgensen Forge 104(e) Response, 1362026, p. 5
Bethlehem Steel		Former Owner/ Operator	1951-1963	Jorgensen Forge 104(e) Response, 1362026, p. 5; TSCA Letter, 1215090, p. 1
Isaacson Iron Works		Former Operator	1942- 1965	Jorgensen Forge 104(e) Response, 1362026, p. 5
U.S. Government		Former Owner	1942 - 1965	Jorgensen Forge 104(e) Response, 1362026, p. 5

EMJ and Jorgensen have an existing agreement in place that divides environmental liabilities for each party. Under that agreement, all upland environmental responsibilities will be addressed by Jorgensen except for investigations required under the current U.S. Environmental Protection Agency (EPA) Administrative Order on Consent (AOC) and the forthcoming EPA Removal Order for sediment remediation adjacent to the property. EMJ and Jorgensen will perform investigation activities associated with this work under a cost sharing agreement [Liability Letter, 627897, 2].

Additionally, Jorgensen is a wholly owned subsidiary of JFC Holding Company. From June 23, 2006 to the present, Constellation Enterprises LLC has owned 96.63% of JFC Holding Company, and Protostar Equity Partners LP is the 100% owner of Constellation Enterprises LLC [Jorgensen Forge 104(e) Response, 1362026, p. 11].

2) Identify the location of the affiliated facilities and properties (e.g., proximity to the Waterway).

The riparian Jorgensen Forge property occupies approximately 20 acres between Slip 4 and Slip 6 on the east bank of the LDW at approximately RM 3.6. The property is developed and the majority is covered with impermeable surfaces that consist of asphalt, concrete paving, and buildings. Portions of the ground surface along the western and northwestern areas of the property are covered with gravel [Data Summary Report, 616091, p. 13].

At some point between 1936 and 1946, fill was placed in a large embayment that was located on the western portion of the property. The source of the fill may be the result of historical hydraulic dredging conducted in the LDW by the Army Corp or unknown upland sources [Data Summary Report, 616091, p. 13; Aerial photographs, 626781]. *See Figure SIA Map.*

The facility is bordered on the west by the LDW, on the north by The Boeing Company's Plant 2, on the east by East Marginal Way and Boeing Field/King County Airport, and on the south by a currently vacant Boeing lot. A 36-inch diameter METRO combined sewer outfall runs along the northern property boundary to its discharge point into the Duwamish Waterway. The facility is within the Tukwila City Limits, but utilizes a Seattle mailing address [2009 SPCC plan, 616383, p. 4].

The Jorgensen Forge facility consists of one large building that contains the melting, forging, and machining operations, and several other structures which house support processes. Most of the area outside the building is paved with concrete or asphalt. Unpaved areas are located in the western portion of the property along the LDW in the northwest and southwest portions of the property. Much of the pavement in the north central portion of the property is a remnant of the former Bethlehem Steel Co. [2009 SPCC plan, 616383, p. 4].

3) Identify releases and/or contamination resulting from operations (Did these occur during ownership of property?).

Current Operations

The Jorgensen Forge facility is an integrated forge shop with melting, forging, heat treating and machining operations. Operations include steel, aluminum, and titanium forgings. Only steel is melted at Jorgensen Forge. Scrap metal is melted in the electric arc furnaces. The molten metal is then poured into molds to cool and harden into ingots. The ingots are then heated as necessary in the forge furnaces and are shaped by large presses into billets. The billets may then go through heat treatment, as required, to develop specific properties in the material. The billets are then machined to exact specifications. Once machining is complete, the metal products are tested, inspected, and then stored pending shipment off-site [Jorgensen Forge 104(e) Response, 1362026, p. 3].

The manufacturing process produces machined steel, aluminum, and titanium forgings, and the following waste or recyclable by-products are generated:

- Billet grindings (recyclable)
- Mill scale
- Melt bag house dust
- Used soluble oil and cleaning solvents (recyclable)
- Used petroleum and hydraulic oils (recyclable)
- Steel and aluminum chips from the machining processes (recyclable)
- Slag from the electric arc furnaces and AOF vessel
- Spent acids and bases from the metallurgical laboratory
- Used spent refractory materials [Jorgensen Forge 104(e) Response, 1362026, p. 3].

Scrap metal (both return scrap and purchased scrap) is melted in the electric arc furnaces in the Melt Shop Area. The melt bag house vacuum operation collects dust generated during melting operations through a bag filter system. The captured dust is conveyed through a closed pipe system in the melt bag house and deposited into a closed, sealed bin, which is located on a concrete slab within a building. This bin is directly transferred to a collection agency for off-site disposal as a dangerous waste designed as K061-Electric Arc Furnace Dust [Jorgensen Forge 104(e) Response, 1362026, p. 6].

During the melting process, oxidizing slag material is used to remove unwanted elements, while reducing slag is added to the argon oxygen decarbonization (AOD) unit to help reduce the steel to keep target elements in the matrix. Ferro alloys are also added to the molten steel to meet specifications. Following the melting process, the added slag is removed from the ladles, temporarily stored on the northwest corner of the property, and then disposed of off-site at a permitted solid waste landfill [Jorgensen Forge 104(e) Response, 1362026, p. 6].

The molten steel is poured into molds to cool and harden into ingots. The ingots are heated as necessary in the forge furnaces and are shaped by four large presses into billets and/or forgings. Aluminum and titanium purchased from outside suppliers is also forged on the company's forging presses. In addition, aluminum, steel, or titanium products are rolled in the ring mill and expanded on the ring mill expander in the Forge Shop Area [Jorgensen Forge 104(e) Response, 1362026, p. 6].

The billets and/or forgings may then go through heat treatment in heat treat furnaces, as required, to develop specific properties in the material. Quenching occurs in horizontal or vertical tanks to control the cooling of the metal. Following forging and heat-treatment, the outer coating of the billets is removed through grinding using a garnet grit. The billet grinding bag house vacuum operation collects dust and small size grindings generated during the grinding operations through a bag filter system. The captured dust/grinding is conveyed via a closed system to a sealed hopper. The resulting grindings are transferred from the sealed hopper and stockpiled on-site on pavement surrounded by stacked Ecology blocks. The swarf (turnings, chips, filings, shavings or chippings of metal. Swarf is the debris or waste resulting from metalworking operations) is either reused in the steel melting process or shipped off-site via trucks and/or railcars for recycling by a third party [Jorgensen Forge 104(e) Response, 1362026, p. 6].

The forgings are machined to exact specifications on lathes and boring mills in the Machine Shop Area. In addition, some steel pieces are bored along the axis inside of the cylinders on the Hollowbore machines in the Hollowbore Area. The chips that result from machining operations are stored outside the main manufacturing building west of the Machine Shop Area or on the paved area on the southern portion of the property. Some of the chips are reused in the manufacturing process [Jorgensen Forge 104(e) Response, 1362026, p. 6].

Once machining is complete, the metal products are tested, inspected, and then stored in the Shipping Area pending shipment off-site [Jorgensen Forge 104(e) Response, 1362026, p. 6].

The facility also includes a metallurgical laboratory. This laboratory performs mechanical testing, metallography, corrosion testing, and chemical analysis on material produced in the manufacturing process [Jorgensen Forge 104(e) Response, 1362026, p. 7].

The following table does not represent a comprehensive list of all environmental assessments and work done at the Jorgensen Forge facility but highlights primary documents used in this 104(e) Response review.

Assessments and Investigations ***(Availability)***	**Facility / Area**	**Date(s)**	**Reference**
Phase I Environmental Site Assessments *(Not Reviewed)*	Jorgensen Forge Facility	2002 1997 1992 1990	Referenced in 623093, p. 8
TSCA PCB Inspection *(Complete)*	Jorgensen Forge Facility	6/14/2002	623093
Phase I Environmental Site Assessment (URS Corporation) *(Complete)*	Jorgensen Forge Facility	12/2/2005	623093, p. 6
Final Investigation Data Summary (Farallon) *(Complete)*	Jorgensen Forge Facility	2/2006	616091
Data Gaps Report for Early	EAA-4	4/2007	625227, p. 72

Action Area 4 (EAA-4) *(Complete)*		(Draft)	
SCAP EAA-4 *(Complete)*	EAA-4	12/2007	Ecology's Website
Final Investigation Data Summary Report (Anchor and Farallon) (N*ot Reviewed)*	Jorgensen Forge Facility	2/13/2008	Referenced in 627899, p. 134
Draft Source Control Evaluation Report (Anchor and Farallon) (*Complete)*	Jorgensen Forge Facility	1/2008	2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185
Final Source Control Evaluation Report (Anchor and Farallon) (*Not Reviewed)*	Jorgensen Forge Facility	5/19/2008	Referenced in 627899, p. 134
Engineering Evaluation / Cost Estimate–draft *(Complete)* (Anchor)	Jorgensen Forge Facility	3/2009	627899
Phase 1 Completion Report (Floyd/Snider) *(Not Reviewed)*	Jorgensen Forge Outfall Area	2011	Not Available
Phase 2 Geoprobe Investigation Summary Report *(Complete)* (Anchor)	Jorgensen Forge Outfall Area	8/8/2012	Not Available

Dredging

Jorgensen Forge does not have any water dependent uses and therefore has not conducted any dredging adjacent to the property. The U.S. Army Corps of Engineers has maintained the dredged channel in the vicinity of the property at 15.1 MLLW, with the most recent dredging event occurring around 1999. In March 2009, Jorgensen Forge and the EMJ submitted a Draft Engineering Evaluation/Cost Estimate (EE/CA) to EPA that identifies a recommended removal action alternative, which includes dredging along portions of the sediments and shoreline bank adjacent to the property. EPA has not yet provided comments on this proposed remedy [Jorgensen Forge 104(e) Response, 1362026, p. 5].

Fill was placed at the property between 1942 and 1946 to fill in the former embayment. This fill has been identified as one potential source of PCB and metals contamination. The source of the fill may have been historical hydraulic dredging conducted in the LDW by the ACOE or from unknown upland sources [Final Investigation Data Summary, 616091, p. 20]. *See Figure SIA Map.*

Spills/Discharges

A 1955 report identifies Bethlehem Steel as discharging caustic wash water to the Duwamish Waterway [1995 An Investigation of Pollution Report, 616086, p. 78]

Jorgensen notified the Ecology Spill Response on June 19, 1998 that an oily substance of unknown volume migrated into a stormwater outfall and discharged to the LDW through stormwater Outfall 003. The source of the discharge or the duration of the discharge was not identified nor were the response actions summarized [2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, p. 71].

Jorgenson Forge employees noted an unidentified source of water discharging from permitted stormwater Outfall 003 under dry weather conditions on August 27, 2004. This discharge created a slight sheen adjacent to and a short distance downstream of the outfall. The flow discharging into the LDW appeared to be larger than the flow present at any of the individual access points. The discharge and resulting sheen was only visible for several hours. The source of the discharge was not identified and follow-up visual inspections did not identify any additional discharge. Additional facility investigations of the stormwater drainage system following the unidentified discharge indicated the Q4 and portable quench tanks were connected to the Outfall 003. These connections were removed in late 2005 [2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, p. 71].

Contamination: Investigations and Remedial Actions
In 1980, EMJ began the retrofitting of the twelve facility transformers to remove PCB containing oil. All current transformers are either new equipment that do not contain oil (e.g. dry type) or used non-PCB oil. Jorgensen Forge representatives have not record or memory of any transformer failures (e.g. blow ups) or oil releases [Jorgensen Forge 104(e) Response, 1362026, p. 7].

In 1988, a RCRA compliance evaluation inspection was conducted. Potential violations included lack of hazardous or non-hazardous determination for waste oil and sludge on the property, and failure to provide treatment standards to designated treatment or disposal facility for a shipment of restricted waste [PRP Summary 0001600023, p. 11].

In 1989, EPA issued a notice of violation and warning letter to EMJ for failure to properly manifest waste under Land Disposal Restrictions and to properly characterize waste oil and sludge. The company responded and satisfied the concerns of the agency [PRP Summary 0001600023, p. 11].

In 1990, a preliminary assessment was conducted at the facility. Soil sampling, subsurface soil sampling, ground water sampling and outfall effluent testing occurred. Total petroleum hydrocarbons were identified in three soil samples. Lead and chromium were found in some soil samples, but did not exceed EP Toxicity values. VOCs were also analyzed for in the soils and only one sample showed elevated levels of cis-1,2-dichloroethene. Outfalls were checked for oil and grease and RCRA metals, and none exceeded the NPDES permit amounts. Groundwater samples indicated that a groundwater well located near the Waterway (MW-1) had exceedances of benzene and cis-1, 2-dichloroethene. Other VOCs were detected but were below MCLs. MW-2 and MW-3 had cadmium, chromium, and lead levels above MCLs and MW-2 also had arsenic above MCLs. Recommendations from this assessment led to further studies and

removals actions conducted under the Ecology Voluntary Cleanup Program [PRP Summary 0001600023, p. 11].

Since 1992, Jorgensen Forge has conducted periodic testing of the twelve transformers to confirm that all transformers currently owned and maintained by Jorgensen Forge continue to be non-PCB containing [Jorgensen Forge 104(e) Response, 1362026, p. 7].

From 1991 to 1997, remedial investigations, feasibility studies and cleanups were conducted at the following areas of the facility:

- Area 1 Hollowbore area
- Area 2 Oil/Water separator
- Area 3 Former UST locations
- Area 4 West of Decommissioned Oil Storage Area
- Diesel Fuel Area - West of Aluminum Heat Treat Building [PRP Summary 0001600023, p. 12]. *See Figure SIA Map.*

Area 1 – Hollowbore Area: Consisted of an area of the property with lathes and associated cutting oil, this location was approximately 780 feet from the Waterway. Area 1 investigations determined that groundwater and subsurface soils were contaminated with hydrocarbons from the cutting oil. A light non-aqueous phase liquid (LNAPL) was found on the groundwater in this area. A pump and treatment system was recommended to address both groundwater and LNAPL contamination. Treated water was discharged into the Waterway. Over the several year operational period, approximately 15,500 gallons of oil were recovered from Area 1 prior to system shut down in May 1996. The monitoring results for multiple monitoring wells in the hollowbore machine area indicate that there is up to 7 to 8 feet of cutting oil on the groundwater surface. The actual thickness in the adjacent soils may be less. However, dissolved concentrations of oil range total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene and xylene (BTEX) in groundwater a short distance downgradient (to the west) of the immiscible oil are below MTCA Method A groundwater Cleanup Levels or were not detected. In May 2005, a groundwater sample from MW-31 contained diesel range hydrocarbons at a concentration (849 ug/L) above the MTCA Method A cleanup level of 500 ug/L and prior detected concentrations [2005 ESA, 623093, pp. 13 and 23; PRP Summary 0001600023, p. 12].

Area 2 - Oil/Water Separator: Located in the east/central portion of the property between the main forge building and the Aluminum Heat Treat Building. The oil/water separator was installed in 1968 to separate residual or spilled hydraulic oil that collected in a sump. Oil releases from the oil/water separator have affected soils around this unit and resulted in a layer of LNAPL on the groundwater surface. Concentrations of TRPH as oil ranging from 26 ppm to 31,000 ppm were detected in soil samples from this area. Concentrations of TRPH at 1,300 *ug/L* and 7,300 *ug/L* were detected in groundwater. An extraction system was installed and operations were initiated in January 1995. Over 414,000 gallons of water were extracted by June 1996, but the system was taken offline so as not to co-mingle the oil with the subsurface diesel fuel contamination identified just south of the oil/water separator. During the extraction system operation, significant changes in the thickness of hydraulic oil as LNAPL or dissolved

concentrations of ORO in groundwater in Area 2 were not observed. Therefore, continued operation of the system was not deemed cost-effective, would not help meet the Ecology MTCA Cleanup Levels without more invasive measures, which are precluded by the current configuration and operations on the property, and would have no apparent beneficial effect on the groundwater in down-gradient monitoring wells located outside of the plume. [2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, p. 76; 2005 ESA, 623093, p. 14; 622853, p. 22; PRP Summary 0001600023, p. 12].

Area 3 - Former USTs: Located in the eastern portion of the property near the main entrance about 1,200 feet from the Waterway. Releases from three USTs caused gasoline and BETX groundwater and subsurface soil contamination. In 1991, tank closure included removal of approximately 65 cubic yards of soil with concentrations of TPH above the regulatory cleanup levels from beneath the USTs. After the tank removals, an air sparge/vapor extraction system was installed in Area 3. The analytical results of groundwater samples collected from approximately 1993 to 1997 indicated that the air sparge/vapor extraction system was effective. In 1999, a No Further Action determination was issued by Ecology for Area 3 [2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, p. 76; 2005 ESA, 623093, p. 14; PRP Summary 0001600023, p. 12].

Area 4 - West of Decommissioned Oil Storage Area: Area 4 is directly west of the Decommissioned Oil Storage Area. The historical use of this area included the storage of heating oil and diesel fuel in ten tanks. The southernmost tank is now used as an oil/water separator. In 1991, concentrations of ORO in soils were detected in this area above the MTCA Method A Cleanup Level. Subsequent investigations concluded that the petroleum hydrocarbons in this area were isolated in extent and relatively immobile. Jorgensen Forge currently conducts routine groundwater monitoring of groundwater quality in Area 4, as represented by monitoring wells MW-8, MW-10, MW-11, and MW-14. The laboratory analytical results of groundwater samples collected from monitoring wells located in Area 4 in 2007 detected concentrations of DRO and ORO exceeding the MTCA Method A Cleanup Levels for Groundwater [2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, pp. 76 and 77].

Diesel Fuel Area - West of Aluminum Heat Treat Building: Groundwater monitoring performed in Area 2 indicated immiscible diesel LNAPL and was first detected on the groundwater surface in well MW-12 in April 1995. The most recent investigation activities conducted in the Diesel Fuel Area include groundwater monitoring and sampling conducted in 2007. The results of the 2007 sampling events indicate that LNAPL is present in monitoring wells MW-12 and MW–33 at thicknesses ranging from 0.60 to 1.59 feet. The results of the 2007 groundwater monitoring and sampling events indicate that the hydraulic oil LNAPL plume within Diesel Fuel Area is confined to a small area on the west side of the Aluminum Heat Treating building. Dissolved phase concentrations of DRO and ORO were detected in 2007 exceeding the MTCA Method A Cleanup Levels for groundwater. The dissolved phase concentrations of DRO and ORO in groundwater in the Diesel Fuel Area are similar to concentrations detected in the area since 1995. The down-gradient extent of LNAPL and dissolved phase TPH in groundwater from the Diesel Fuel Area are delineated by observations and results from monitoring wells MW-32 and MW-36, in which no LNAPL has been measured

and concentrations of DRO and ORO are below the MTCA Method A Cleanup Levels for groundwater. The monitoring results in multiple monitoring wells in this area indicate that there are up to a few feet of diesel fuel on the groundwater surface. There have not been significant changes in the thickness of immiscible diesel or dissolved concentrations of diesel TPH in groundwater. The lateral extent of diesel range TPH in groundwater is well within the property boundaries and does not appear to be migrating [2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, p. 77].

In 2001, an EPA TSCA inspection noted, there are three transformers on the property owned and maintained by Seattle City Light. Seattle City Light has indicated it has no information concerning the presence or absence of PCB containing oils in the three transformers [Jorgensen Forge 104(e) Response, 1362026, p. 7].

In 2002, EPA conducted a TSCA PCB inspection at the facility. Most of the electrical equipment was installed when the buildings were constructed. The facility has fourteen transformers. Twelve of these transformers previously contained PCBs. The PCB transformers were retrofilled in 1980 and subsequently reclassified as containing less than 50 ppm of PCBs. Any new transformers installed have either been the dry type or were certified to contain no PCBs. During the inspection, no obvious source of PCBs other than the transformers that were retrofilled to levels less than 50 ppm. No signs of spills or leaks were observed [PCB inspection, 623093, p. 2].

In 2004, pursuant to an Agreed Order with Ecology, EMJ was directed to determine if current and/or former operations at the facility had been a source of PCBs and metals to the sediment in the Waterway. To this end, an investigation was conducted and documented in the 2006 *Final Investigation Data Summary Report*. The three phases of the investigation consisted of review of facility historical practices; environmental sampling (soil/fill near shoreline bank, shoreline bank-face fill, shoreline debris piles, and solids in the stormwater catch basins) and analysis (PCBs and metals); and sampling of nearshore surface and subsurface sediment [Data Summary Report, 616091, p. 11]. Findings included:

- In *fill* samples, concentrations of PCBs exceeded the screening level (LAET – lowest apparent effect threshold; 2LAET – Upper LAET) collected at all seven of the soil borings. The analytical results detected concentrations of PCBs exceeding the LAET in four soil borings. The results also detected concentrations of PCBs exceeding both the LAET (0.130 mg/kg) and the 2LAET (1 mg/kg) in soil collected from the remaining three borings located on the shoreline. Two samples detected arsenic at concentrations exceeding the SQS but below the CSL. Concentrations of chromium, copper, lead, mercury and zinc exceeded the SQS and the CSL [Data Summary Report, 616091, pp. 24 and 25].
- In *shoreline bank-face fill* samples, concentrations of PCBs ranged from 0.0255 to 4.54 mg/kg. All five samples exceeded the LAET of 0.130 mg/kg and two samples exceeded the 2LAET of 1 mg/kg. Arsenic concentrations ranged from 9.95 mg/kg to 64.9 mg/kg with one sampling exceeding the CSL. Cadmium exceeded SQS and CSL in all samples collected and chromium exceeded SQS and CSL in two samples. Copper exceeded its screening levels in one sample and lead exceeded the SQS and the CSL in four samples

ranging from 1,010 to 5,450 mg/kg [Data Summary Report, 616091, p. 26]. *See Figure Lead Data for Soil.*

- In the two *debris pile* samples, PCBs were found at 2.34 and 2.06 mg/kg, exceeding the LAET of 0.13 mg/kg. Results identified concentrations of copper and lead exceeding the SQS and CSL in the debris samples. Chromium and zinc exceeded the SQS and the CSL in one of the two debris pile samples [Data Summary Report, 616091, p. 27].
- In the *catch basins solids,* PCBs in concentrations ranged from 0.129 mg/kg to 0.302 mg/kg. Three out of four samples exceeded the LAET of 0.13 mg/kg. Solid samples collected from the catch basins detected concentrations of chromium, copper, and zinc exceeding the SQS and CSL [Data Summary Report, 616091, p. 28]. Chromium was detected in all four of the catch basin samples, at concentrations ranging from 3,110 mg/kg to 10,100 mg/kg, all of which exceed the screening level of 260 mg/kg. Concentrations of copper ranging from 1,060 mg/kg to 2,090 mg/kg exceed the screening level of 390 mg/kg in all four samples collected. Concentrations of nickel were detected in all four of the catch basin samples exceeding the screening level, which is the natural background soil metals concentration for the Puget Sound Region. Zinc exceeded the screening level of 410 mg/kg with detected concentrations ranging from 1,030 mg/kg to 1,090 mg/kg [2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, p. 110].

Concentrations of PCBs above the screening levels, as defined in the Investigation Data Summary Work Plan, were detected in fill along the shoreline of the LDW, stormwater conveyance system catch basins solids and in the LDW sediments adjacent to the property. The nature and extent of PCBs in the uplands portion of the property was not consistent with surface releases. The distribution of PCBs in the fill was entirely consistent with the placement of fill that contained PCBs as a result of historical dredging of the LDW by the ACOE [Data Summary Report, 616091, p. 44].

Boeing Investigation into the Property Line Outfalls

As part of a Boeing PCB investigation at Boeing Plant 2, which is adjacent to Jorgensen Forge, Boeing conducted an investigation of the 12- and 24-inch Property Line outfalls. The Property Line outfalls transit the Jorgensen Forge parallel to the Jorgensen Forge/Plant 2 property boundary. *See Figure Stormwater Drainage System.* The investigation included collecting and analyzing solids material within the Property Line outfalls and conducting a video survey of the outfalls to document any cross connections to the outfalls. Elevated levels of PCBs were found in the Property Line Outfall solids with a maximum concentration of 10,000 mg/kg [2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, pp. 80 and 108].

The video survey of the Property Line pipes identified two drainage lines connected to the 24-inch Property Line outfall, including a 15-inch diameter pipe extending from Plant 2, and a historical 12-inch diameter pipe extending from the Jorgensen property. The video survey documented the Property stormwater lines being used for ongoing discharges of stormwater from the Boeing Plant 2 facility and the King County International Airport (KCIA) and does not include discharge of stormwater from the Jorgensen Forge Facility [2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, pp. 81 and 138].

Jorgensen's interpretation is that the results indicate there are no known current or past sources of PCBs associated with the EMJ and/or Jorgensen operations. PCBs and elevated concentrations of several metals have been detected in the subsurface fill (dredged from the Duwamish Waterway and placed on-site sometime between 1942 and 1946), debris piles along the bank, and sediments. The probable source of the PCBs to Duwamish Waterway sediments is discharged from the stormwater sewer lines located along the northern property boundary with Boeing Plant 2 and placement and subsequent erosion of PCB contaminated fill on-site. However, erosion of PCB contaminated fill and the debris piles may have contributed relatively minor amounts of PCBs and some of the metals may be due to past runoff from the Jorgensen Forge facility [2005 ESA, 623093, p. 25; 2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, p. 109]. *See Figures – Total PCBs in Soil, and Surface Sediment Contours - Total PCBs.*

The Boeing Company, Jorgensen Forge, and EMJ entered into a Memorandum of Understanding to establish a working agreement between the parties to coordinate and cooperate in the cleanup of sediments and the associated sediment-shoreline bank interface areas in the LDW within the Transition Zone. The Transition Zone covers the sediment and shoreline bank near the Property Line Outfalls [Draft MOU, 626780, p. 1].

In February 2011, a Phase 1 Investigation was initiated on behalf of Jorgensen and Boeing, advancing 12 direct--push borings to a depth of 15 to 25 feet below ground surface (bgs) along three transects perpendicular to the shoreline to evaluate whether a release of hazardous substances occurred to subsurface soil beneath the corrugated metal section of the outfall pipes. The results identified elevated PCB concentrations in soil at depths from 8 to 25 feet bgs in the western portion of the outfall area [2012 Phase 2 Geoprobe Investigation Summary Report, p. 1].

In March 2012, a Phase 2 investigation was conducted to further assess the nature and extent of the PCB contamination in the soil and to define any potential further removal actions in the outfall area. A total of 91 soil samples were analyzed for PCBs. Concentrations of PCBs were detected in soil in all Phase 2 Investigation borings at various depths ranging from approximately 2 to 32 feet bgs. The detected concentrations of total PCB concentrations greater than 1 mg/kg in soil ranged from 1.08 to 359 mg/kg. VOCs, SVOCs, and metals were also analyzed for but were not detected above screening levels except in one instance where lead and cadmium were above screening levels. The report concluded that PCBs were vertically bounded in depth. In addition, elevated PCBs concentrations were identified in debris fill, debris--free granular fill and native materials. Elevated metals concentrations were identified in debris fill, however, data are insufficient to draw a similar conclusion regarding metals in the surrounding material. Accordingly, debris fill is not a definitive indicator of an original source of PCBs and is indeterminate regarding metals within the Outfall Area [2012 Phase 2 Geoprobe Investigation Summary Report, pp. 11, 17, 18].

Contamination in Waterway Sediments

According to the LDW GIS Map, arsenic (max: 481 ppm just south of the Jorgensen property line; SQS: 57 ppm), dioxins/furans, PCBs (max: 3700 ppm OC-Norm; SQS: 12 ppm), PAHs,

lead (max: 3500 ppm, with 23,000 ppm just north of the property line; SQS: 450 ppm), copper (max: 2500, with 12000 ppm just north of the property line; SQS: 390 ppm), and zinc (3,500 ppm, with 9700 ppm just north of the property line; SQS: 410 ppm) all have been sampled at elevated levels or above the SQS in the sediments adjacent to the Jorgensen Forge parcel. There is no SQS with which to compare PAHs and dioxins/furans [LDW GIS Map].

4) Describe migration pathways.

Stormwater Discharge
Stormwater runoff from the property discharges to the LDW subject to Jorgensen's NPDES Industrial Stormwater General Permit (No. SO3003231C). The stormwater conveyance system consists of 19 catch basins and underground piping that historically discharged and currently discharges to the LDW through permitted outfalls. The stormwater conveyance system captures stormwater runoff from impermeable surfaces, including paved areas outside the existing buildings, and the building roof drains. Surface water within the interior of the buildings is not captured or delivered in the stormwater collection and conveyance system. Historically, nine outfalls, identified as outfalls 001 through 009, existed on the facility and discharged stormwater to the LDW. Stormwater runoff from the eastern side of the property discharges to the King County Metro stormwater system [Data Summary Report, 616091, p. 14]. *See Figure Site Drainage.*

In the mid-1980s, outfalls 005 to 009 were plugged using concrete, and a dye tracer study was used to confirm complete enclosure of each outfall. These outfalls are no longer active. The origins of stormwater that discharged through each of these historical outfalls have not been determined. Attempts to trace the stormwater lines from the outfalls to identify their origin were unsuccessful [Data Summary Report, 616091, p. 14].

Stormwater from impermeable surfaces and roof drains; groundwater that accumulates in the vacuum degasser pit, railroad scale sumps, electric furnace pit, argon-oxygen-decarbonization (AOD) and scale sumps; and non-contact cooling water from the cooling tower system are periodically discharged through outfalls 001, 002, 003, and 004. Three outfalls collect stormwater and, in some cases, groundwater from sumps. Stormwater from the parking area adjacent to the property is discharged to the Metro stormwater system. Outfall 001 collects stormwater, including roof drains, from the southern portion of the property. On occasion, small amounts of groundwater that accumulates in the Vacuum Degasser Pit also discharge to outfall 001. Outfall 002 collects stormwater, including roof drains, from the southern portion of the property. Outfall 003 collects stormwater, including roof drains, from the remainder of the property. On occasion, small amounts of groundwater that accumulates in the AOD scale sump also discharge to outfall 003 [Data Summary Report, 616091, p. 14].

The concentrations of chromium, copper, and zinc detected in surface sediment adjacent to Jorgensen Forge, surrounding outfalls 003, 004, and 005, are similar to the concentrations detected in the solids samples collected from the catch basins. Outfall 003 consists of an 18-inch diameter ductile iron pipe, extending through the sheet pile wall at an elevation of 8.91 feet above the mean lower low water. The surface of the bank beneath outfall 003 is composed of

armored rock. Stormwater discharged through outfall 003 during low tides is expected to flow across the bank with little to no erosion of bank material and little to no deposition of solids. Any suspended solids in the stormwater stream, including metals, could be deposited on top of surface sediment when the velocity of the stormwater discharge decreases upon entering the LDW. This material could then be transported to the surrounding sediments during tidal fluctuations. Given the similarity in metals concentrations identified in sediments in the vicinity of this outfall and the catch basin solids (CB1, CB2, and CB3) conveyed through this outfall, prior to implementation of BMPs in 2005, outfall 003 was a likely source of metals to the LDW [Data Gaps report, 625227 p. 139].

Exceedences of some of the stormwater benchmark parameters have occurred in the recent past. For example, in 2004 Jorgensen Forge was required to initiate a Level Three Response Action to identify the source of the observed elevated concentrations of zinc. Sampling and analysis has shown four or more exceedances of the Action Levels defined in the revised Permit for samples collected since December 31, 2004 [625215, p. 3].

The catch basins were cleaned out in 2004/2005 and have been protected from further sedimentation through the implementation of BMPs. These procedures have decreased the likelihood that outfalls 001, 002, and 003 continue to contribute to PCB contamination of the LDW [Data Gaps Report, 625227, p. 139].

Erosion of bank material
Concentrations of PCBs and metals have been detected in the shoreline bank of the Jorgensen Forge facility. This bank material was likely dredged from the LDW and placed on-site as fill by the U.S. Army Corp of Engineers. Historically, bank erosion was likely a source of PCBs and metals contamination for the adjacent sediments in the LDW. Currently, the shoreline bank is heavily armored with riprap, woody debris, vegetation, and steel sheet pile/concrete bulkhead. However, contamination in the shoreline bank occurs within the intertidal zone, which is flooded twice a day by tides. In addition, there are debris piles in the intertidal zone. For this reason, contamination in the shoreline bank is likely eroding and leaching into the sediments of the LDW [2007 EAA-4 SCAP, p. 3-55].

5) Is there noteworthy information about others?

Jorgensen Forge has no subsidiary entities [Jorgensen Forge 104(e) Response, 1362026, p. 11].

Earle M. Jorgensen Company. From 1966 to 1992, the Jorgensen Forge Corporation was a division of the Earle M. Company [Jorgensen Forge 104(e) Response, 1362026, p. 11].

The Jorgensen Forge Corporation. From 1992 to 1995, the Jorgensen Forge Corporation operated as an independent corporation [Jorgensen Forge 104(e) Response, 1362026, p. 11].

Hancock Park Partners. In 1995 and 1997, the Hancock Park Partners, a private equity company, acquired Jorgensen Forge Corporation [Jorgensen Forge 104(e) Response, 1362026, p. 11].

JFC Holding Corporation. Since 1997, Jorgensen Forge has been a wholly-owned subsidiary corporation of JFC Holding Corporation. JFC Holding Corporation is a holding company created under a new private equity owner, Key Equity Capital Corporation [Jorgensen Forge 104(e) Response, 1362026, p. 11].

BP Metals LLC. From 2006 to 2008, BP Metals LLC acquired JFC Holding Corporation from [Jorgensen Forge 104(e) Response, 1362026, p. 11].

Constellation Enterprises LLC. On June 23, 2008, Constellation Enterprises LLC acquired 96.3% of JCF Holding Corporation [Jorgensen Forge 104(e) Response, 1362026, p. 11].

Protostar Equity Partners LP. The 100% owner of Constellation Enterprises LLC [Jorgensen Forge 104(e) Response, 1362026, p. 11].

6) Identify key outstanding issues.

Ownership of the 15-inch and 24-inch Property Line outfalls located on the northern portion of the SIA has not been established. The ownership of the Property Line stormwater lines has been researched but has yet to be determined. Additional work is necessary to determine ownership. However, the documented use of the stormwater lines has been identified and includes ongoing discharges of stormwater from the Boeing Plant 2 facility and the KCIA and does not include discharge of stormwater from the Jorgensen Forge Facility [2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, p. 138].

The 2008 Source Control Evaluation Report identified the following data gaps:

- There is insufficient data available for SVOCs and PAHs in groundwater to adequately assess the potential groundwater impacts from these chemicals to sediment quality,
- The quality of stormwater that infiltrates into the railroad scale vault, groundwater that infiltrates into the vacuum de-gassing pit, and fluids that potentially enter the AOD vault and are subsequently pumped to the stormwater conveyance system has not been determined,
- The impacts of potential source areas in the Forge Shop Area and the Melt Shop Area to soil and groundwater have not been evaluated,
- The extent of LNAPL on the SIA has not been fully defined,
- The existing BMPs have not been evaluated for their effectiveness to control the impacts of the storage, distribution, and incidental releases of petroleum products on the property [2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, p. 139].

Reviewer's Notes

The reviewer had no additional comments that are not addressed in the sections above.

Jorgensen Forge Corporation - Parcel 0001600023
8531 East Marginal Way S
Seattle, WA 98134
Arsenic and Dioxins/Furans [LDW GIS Map]


0001600020
2824049007
S 86th Pl
0001600044
7884100465
7884100455
7884100145
7884100445
7884100535
7884100110
7884100350
Duwamish Waterway
33240 4HYDR
0001600023
0001600049
0001600019
0001600014
0007400032
0007400033
7883608601

Jorgensen Forge Corporation - Parcel 0001600023
8531 East Marginal Way S
Seattle, WA 98134
PCBs and PAHs [LDW GIS Map]


0001600020
2824049007
S 86th Pl
0001600044
7884100465
7884100455
7884100145
7884100445
332404HYDR
7884100535
7884100110
7884100350
0001600023
0001600049
0001600019
0001600014
0007400032
7883608601
0007400033
Duwamish Waterway
36
37
38

Jorgensen Forge Corporation - Parcel 0001600023
8531 East Marginal Way S
Seattle, WA 98134
Lead, Copper, and Zinc [LDW GIS Map]


0001600020
2824049007
S 86th Pl
0001600044
7884100465
7884100455
7884100145
7884100445
7884100535
7884100110
7884100350
Duwamish Waterway
33204HYDR
0001600023
0001600049
0001600019
0001600014
0007400032
0007400033
7883608601

[SIA Map, 2008 Draft Source Control Evaluation Report, p. 267]

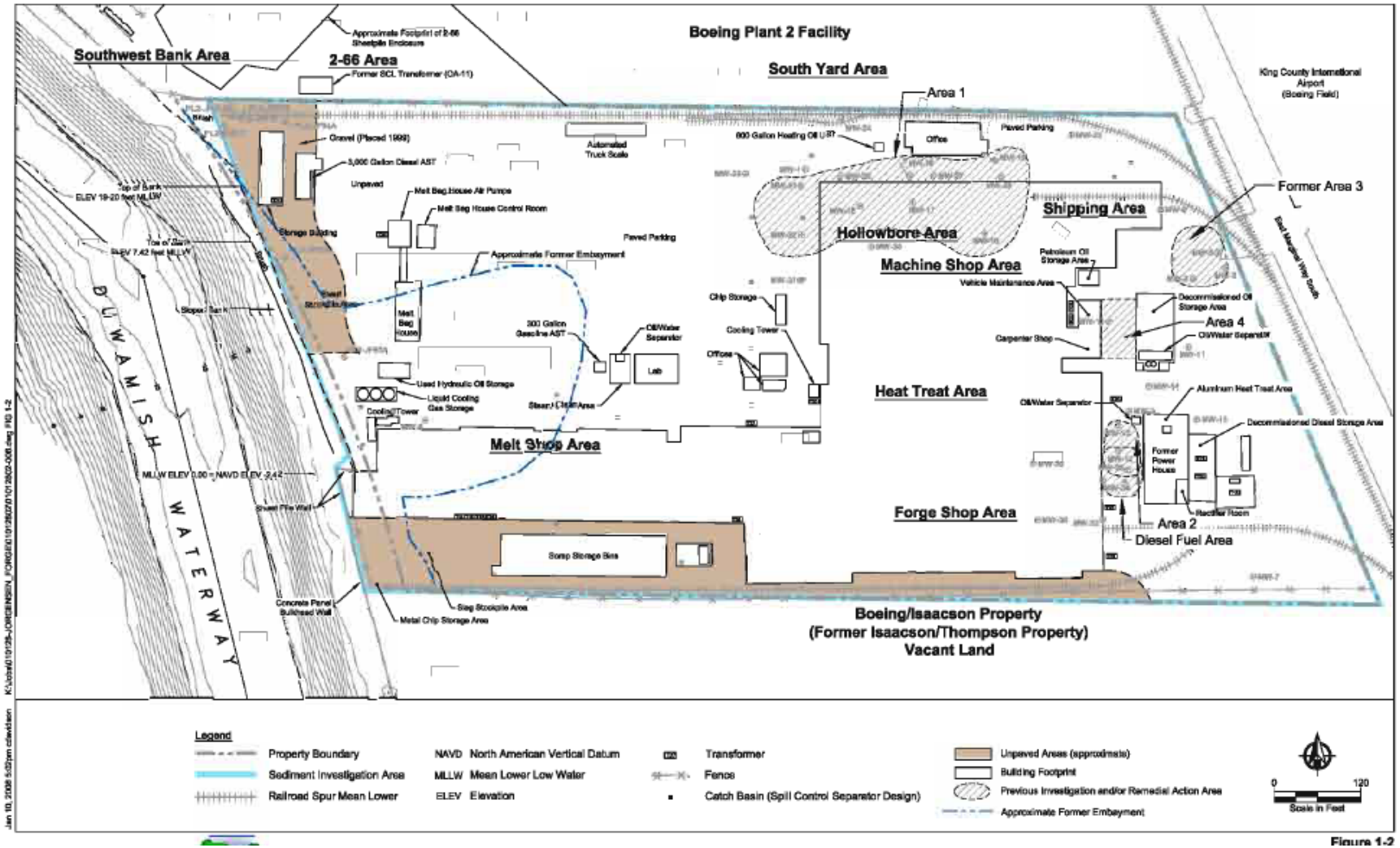
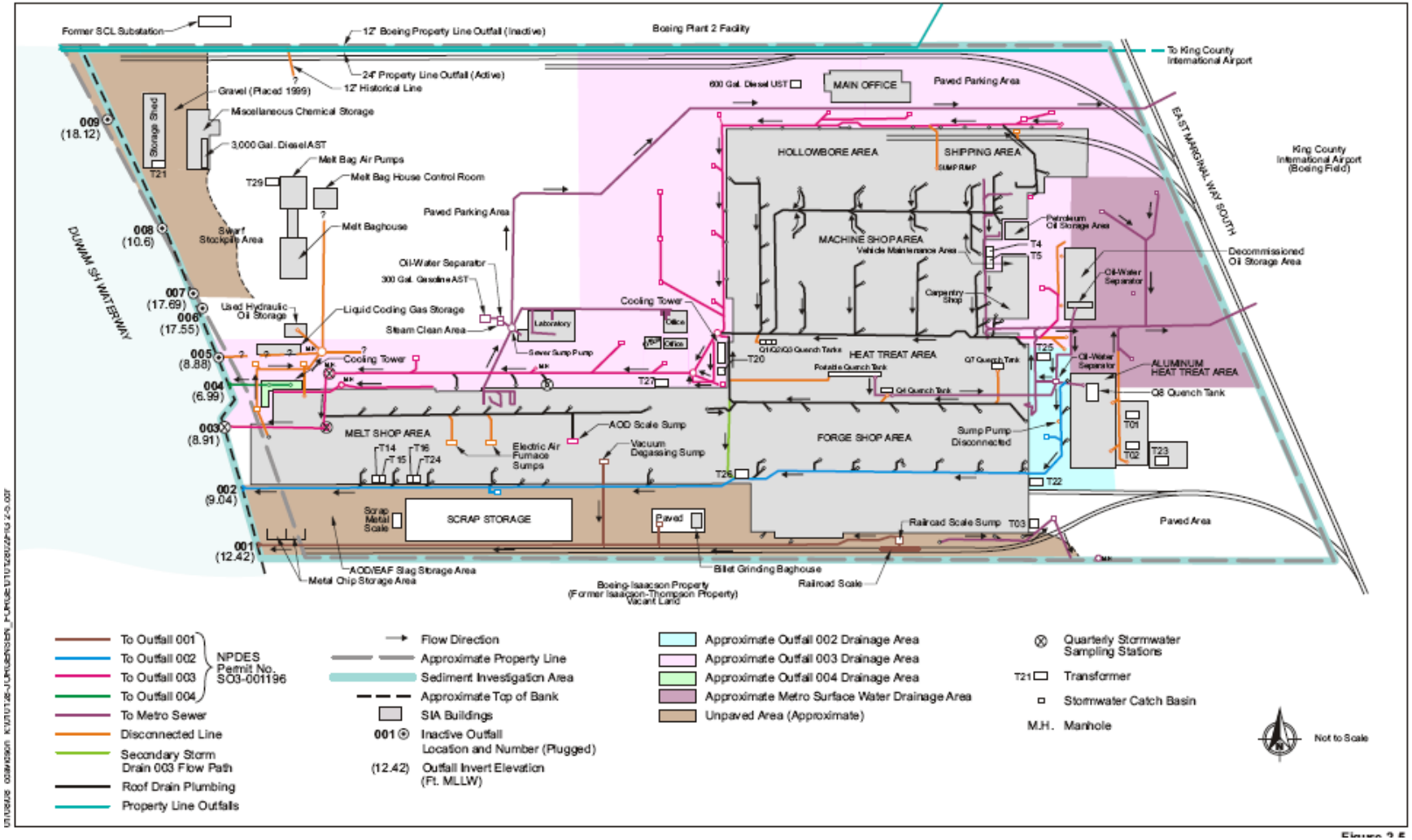
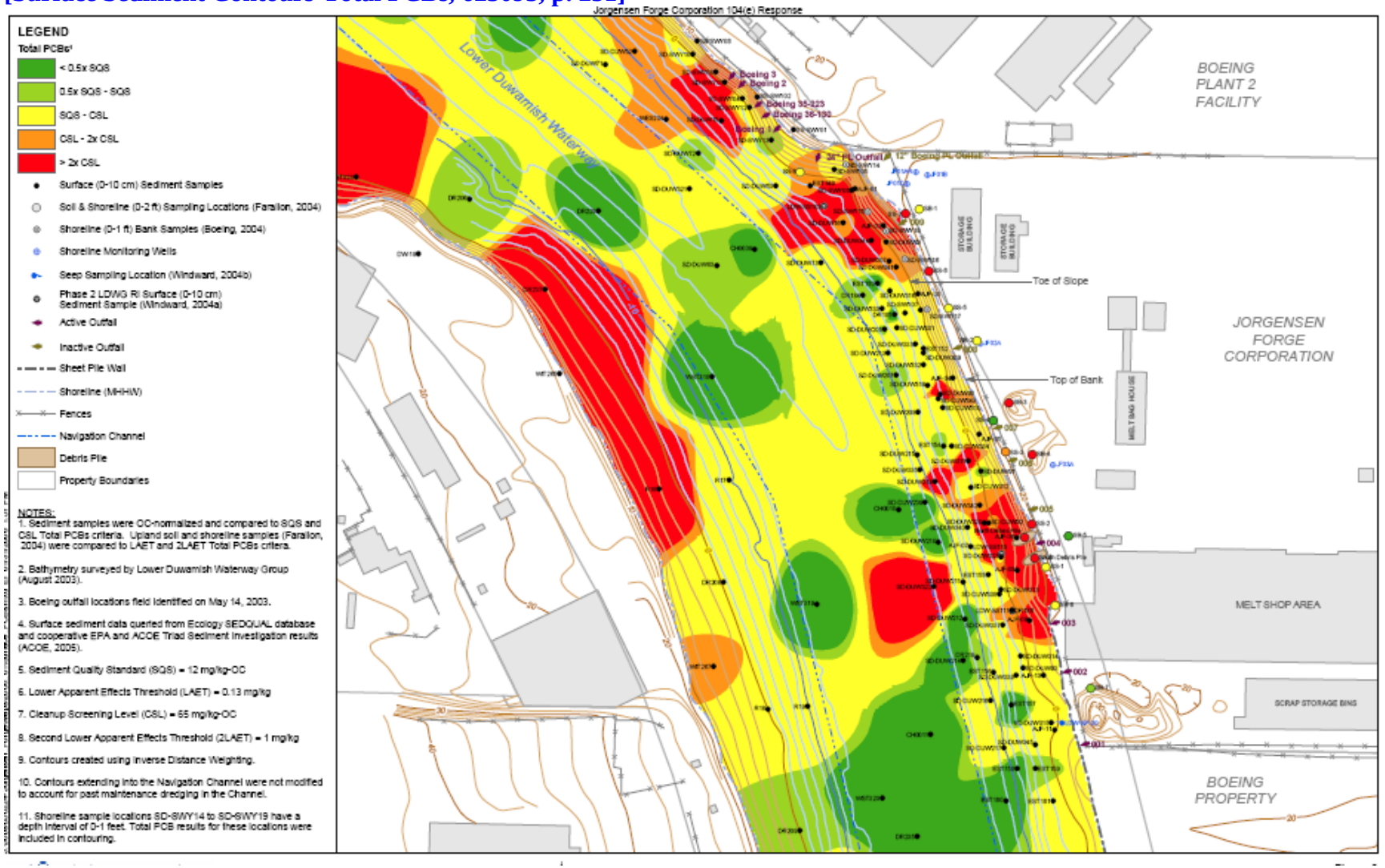


Figure 1-2

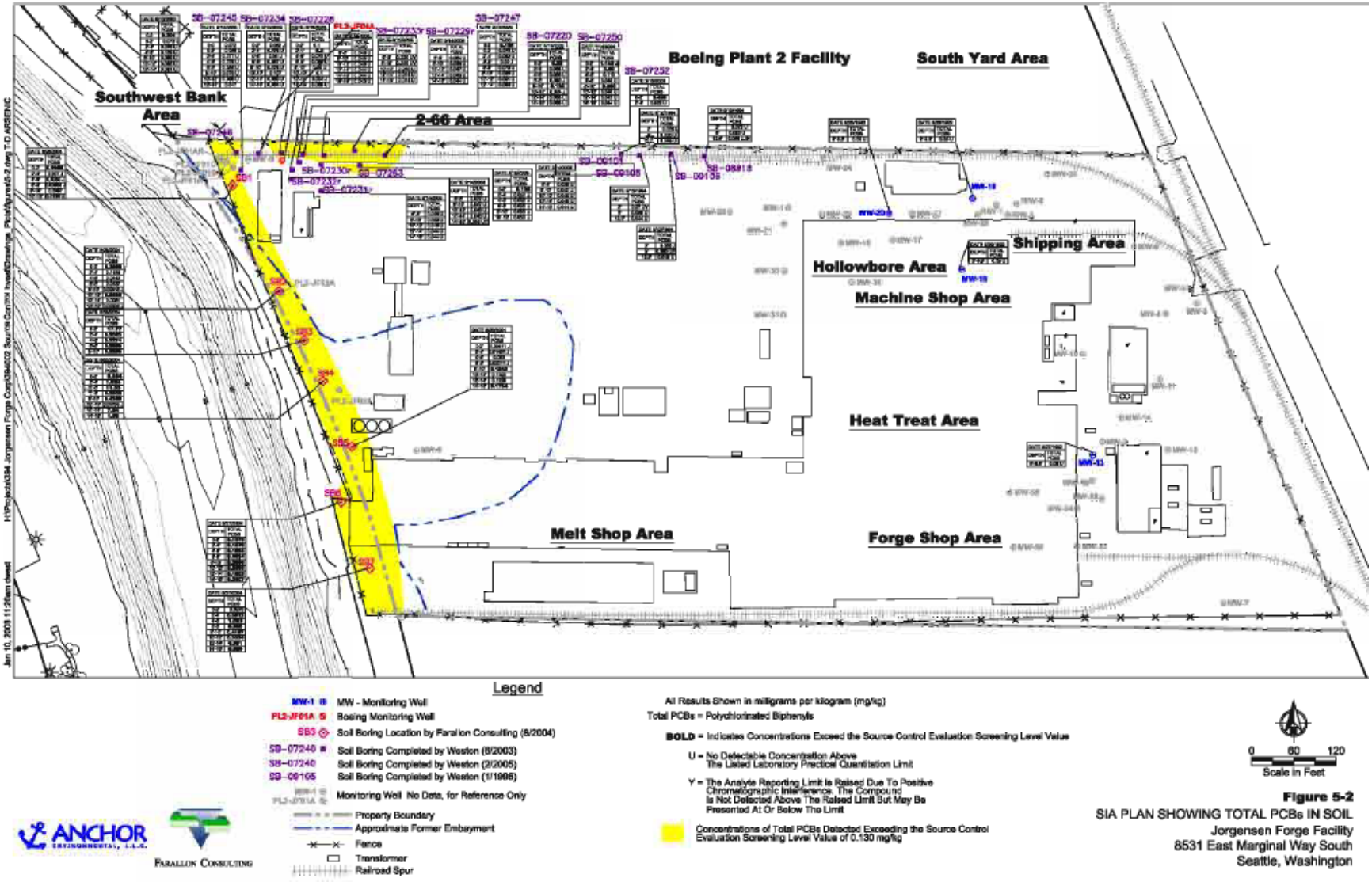
[Current Site Stormwater Drainage Plan, 2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, p. 275]



[Surface Sediment Contours-Total PCBs, 623093, p. 251]



[Total PCBs in Soil, 2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, **p. 277]**



[Lead Data for Soil, 2008 Draft Source Control Evaluation Report, Ecology Source Doc #3185, p. 283]

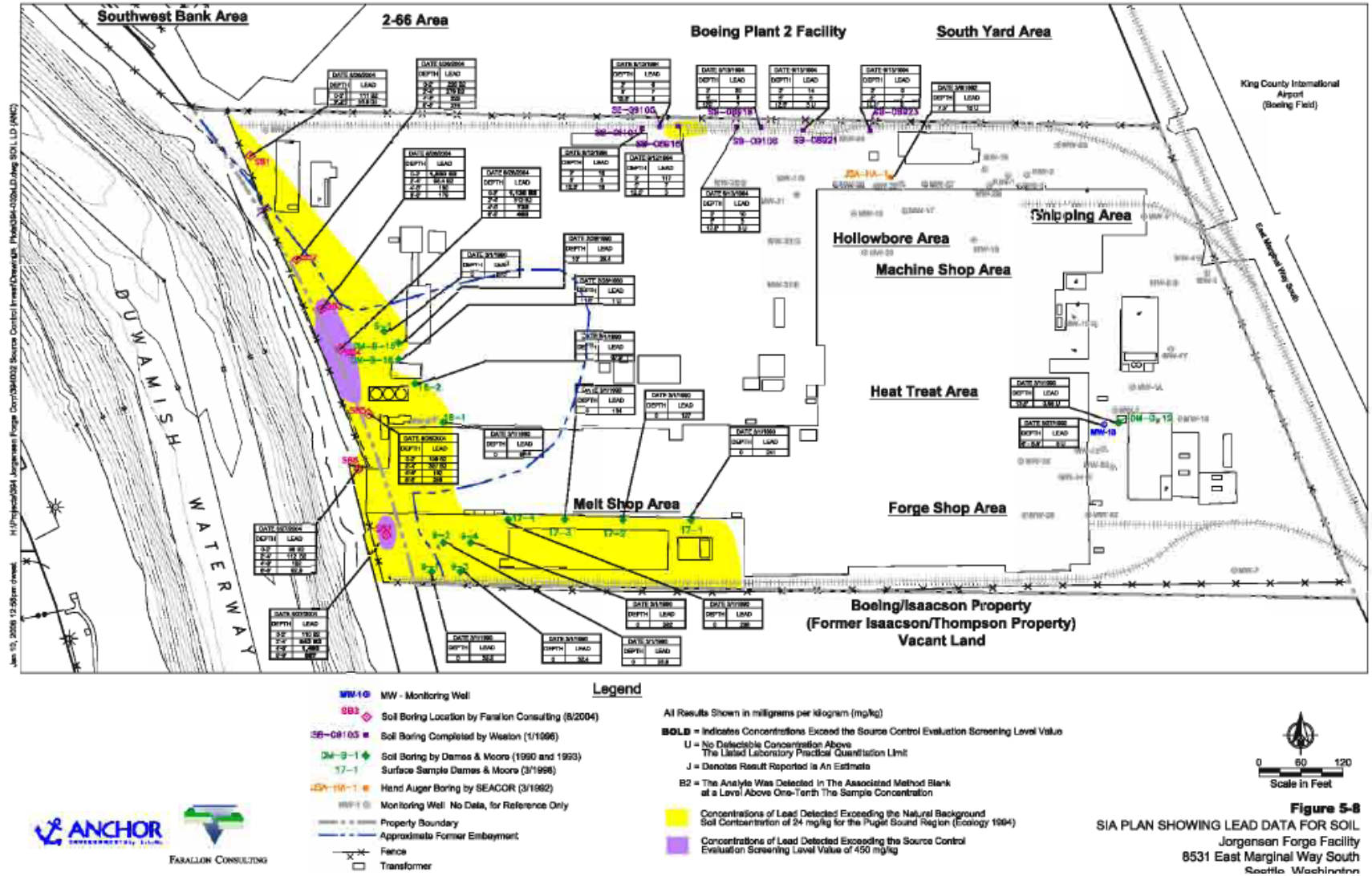


Figure 5-8
SIA PLAN SHOWING LEAD DATA FOR SOIL
Jorgensen Forge Facility
8531 East Marginal Way South
Seattle, Washington